

# MATLS 2H04A/B – INTEGRATED LEARNING IN MATERIALS ENGINEERING

Fall 2020/Winter 2021

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**Office hours:** TBD

## Teaching Assistants:

TAs: Peter Neathway ([neathwap@mcmaster.ca](mailto:neathwap@mcmaster.ca)) (communications and tutorials)  
Isabella (Izzy) McDonald ([mcdonali@mcmaster.ca](mailto:mcdonali@mcmaster.ca)) (Lab C demo and L03 section)  
Coleton Parks ([parksc1@mcmaster.ca](mailto:parksc1@mcmaster.ca)) (Lab A demo and L01)  
Connie Pelligrà ([pelligc@mcmaster.ca](mailto:pelligc@mcmaster.ca)) (Lab B demo and L02)

**Lectures:** Lectures will be livestreamed via MS Teams, for which all enrolled students should have received a notification of team membership. Lectures will take place every Thursday from 12:30 – 13:20 for both the Fall 2020 and Winter 2021 semesters.

**Tutorials:** Tutorials will be held via MS Teams on Fridays from 10:30 – 11:20 for both the Fall 2020 and Winter 2021 semesters. Tutorials will use the same MS Team as the lectures

**Laboratories:** MATLS 2H04 has three laboratory sections scheduled on Monday 08:30-11:20 (L01), Wednesday 08:30 – 11:20 (L02) and Wednesday 14:30 – 17:20 (L03). Laboratories will be held via MS Teams, where there will be a separate MS Team for each laboratory section. Students will be distributed into laboratory teams of three students unless circumstances require the formation of a limited number of 2 or 4 student laboratory teams. Laboratories will start on September 21<sup>st</sup> for the Fall 2020 semester and on a date to be determined for the Winter 2021 semester.

## Learning Outcomes

By the end of this course, the student should be able to:

1. Develop an understanding of structure/property relationships in engineering materials.
2. Employ standard materials characterisation techniques and testing methods to determine materials microstructures and selected mechanical properties.
3. Demonstrate an ability to integrate enabling structure/property relationships in engineering materials into the design process.
4. Employ standard material property testing methods to evaluate suitable functional performance for design evaluation purposes.
5. Generate ideas in a structured fashion with others with confidence.
6. Effectively communicate their laboratory findings and design solutions through written and oral reports and graphical communication tools, as appropriate.

**Graduate Attributes:**

MATLS 2H04 provides the undergraduate student the opportunity to develop competence in the following CEAB graduate attributes:

Graduate Attributes	Learning Outcome Measurement Point
Investigation: (3.1 – Ability to recognize and discuss theory knowledge base)	1
Design 4.1 (Recognizes and follows an engineering design process.)	3,4
Design 4.4 (Employs appropriate techniques for generation of creative ideas such as brainstorming and structured inventive thinking)	5
Use of Engineering Tools: (5.2 – Demonstrates ability to use modern/state of the art tools)	3
Teamwork: (6.3 – Able to work in a group, taking leadership roles as appropriate and relinquishing leadership as appropriate)	3,4,5
Communications Skills: (7.3 – Constructs effective oral or written arguments as appropriate to the circumstances)	6

**Teaching Assistant Office Hours:** TA office hours will be determined via a straw poll conducted in class to facilitate student access. It is strongly suggested that you attempt to contact the TAs during scheduled office hours or during tutorials. Appointments outside of office hours should be arranged using the e-mail hyperlinks provided above.

**Course Website:** MATLS 2H04 has an Avenue to Learn (A2L) site, which students can access via their MacID and password. The course A2L site is an important means of communication between Drs. Kish/McDermid and the students and should be consulted regularly. Course announcements, project and assignment information (including due dates), lecture notes, laboratory manuals/safety questions and tutorial information (including exercises) can be accessed through the MATLS 2H04 A2L site. It is important to note that the website is not a substitute for attendance of lectures and tutorials. Students are reminded that they are solely responsible for keeping up-to-date with all course announcements, instructional materials and due dates, including postings on the course A2L site. Students should inform the course instructors if they encounter problems with the course A2L site.

**Important Dates:** The following are draft due dates for major coursework components for MATLS 2H04A/B. Students should note that the below due dates are subject to minor alterations depending on the delivery of lecture materials and other factors. It is the student’s responsibility to be aware of any alterations in the due dates for coursework via in-class announcements or the MATLS 2H04A A2L site.

Item	Date
Literature Survey Proposal	September 28 <sup>th</sup>
Laboratory A Presentation, Report and Feedback	October 5 – 9 <sup>th</sup>
Laboratory B Presentation, Report and Feedback	November 9 – 13 <sup>th</sup>
Literature Review Report	November 23 <sup>rd</sup>
Laboratory C Presentation, Report and Feedback	November 30 – December 4 <sup>th</sup>
Fall Term Final Laboratory Report	December 16 <sup>th</sup>
Creative Thinking Reflection	February 5 <sup>th</sup>
Draft Design Report	February 12 <sup>th</sup>
Idea Pitch	March 15 <sup>th</sup> – March 19 <sup>th</sup>
Idea Brief	March 26 <sup>th</sup>
Design Presentations	March 29 <sup>th</sup> – April 2 <sup>nd</sup>
Final Design Report	April 21 <sup>st</sup>

**Texts:**

Texts (Required):

- W.D Callister and D.G. Rethwisch, Materials Science and Engineering, An Introduction, (John Wiley & Sons Inc.). Any recent edition will suffice (8<sup>th</sup>, 9<sup>th</sup>, or 10<sup>th</sup>).
- J.M. Lannon, L.J. Gurak, D. Kleep and S. Kelly, Revel for Technical Communication, Eighth Canadian Edition (Pearson Canada, 2021). ISBN 9780135420157

Texts (Optional):

- T. Seeling, InGenius (Harper Collins, 2015) ISBN 9780062020710
- S. Berkun, The Myth of Innovation (O’Reilly Media, Inc., 2010). ISBN: 9781449389628

**Software:**

All students are required to download and install a free copy of the GRANTA EduPack 2020 software from the course A2L site, for which installation instructions will be posted on the course A2L site. This software is required for MATLS 2H04B in order to allow students to select their optimal material for the assigned Winter 2021 semester design project. Unfortunately, an Apple iOS-compatible version of the GRANTA EduPack software does not exist and students with Apple computers will have to run the software using a Windows partition. The use of earlier versions of the software (known as CES EduPack) is strongly discouraged as there have been significant alterations to the database which may not yield the same materials choices for a given materials index or design criteria. Students are advised that they use earlier versions of the EduPack software at their own risk.

**Course Assessment**

The following mark distribution will be used for MATLS 2H04A:

1. Literature Review Proposal:	10%
2. Tutorial Assignments/Exercises	10%
3. Literature Review Report:	20%
4. Laboratory Pre-Quizzes:	5%
5. Laboratory A – C Presentations and Reports:	10% each
6. Final Laboratory Report:	25%

Elements (1) through (4) will be assessed as individual student submissions and elements (5) and (6) will be laboratory team submissions.

The following mark distribution will be used for MATLS 2H04B:

1. Draft Design Report:	10%
2. Design Presentation:	15%
3. Final Design Report:	25%
4. Idea Pitch:	15%
5. Creative Thinking Reflection:	10%
6. Idea Brief:	15%
7. Tutorial Assignments/Exercises:	10%

Please note that elements (1) through (4) are design team submissions and elements (5) through (7) are individual student submissions.

The overall grade for MATLS 2H04A/B will be an evenly-weighted composite of the marks earned by the student in the Fall 2020 and Winter 2021 semesters. General information concerning the course elements is provided below as are the course policies on late course work submission and use of the McMaster Student Absence Form (MSAF). Detailed information concerning the course elements is provided in the document “*MATLS 2H04A Detailed Course Elements*” and “*MATLS 2H04B Detailed Course Elements*” documents, posted on the course A2L site.

Unless otherwise noted, all coursework is due by 17:30 on the designated due date and should be submitted to the appropriate A2L assignment folder. Neat, legible sample calculations appended to the laboratory reports or design calculations are acceptable and encouraged. The body of all reports should be word processed according the assignment/report descriptions provided.

### **General Description of Lecture, Tutorial and Laboratory Content**

The lectures of MATLS 2H04A will consist of the following elements:

- refresher on steel physical metallurgy, phase diagram and mechanical properties based on knowledge previously provided in MATLS 1M03 and IBEHS 1P10;
- technical communications, including conventions for engineering-based technical written and oral communications, graphics and other forms of graphic communication;
- rudimentary data analysis, including basic statistical function, error analysis and Excel;
- literature surveys of technical literature.

The tutorials in MATLS 2H04A will comprise in-class exercises during which students will practice and master the communications tools and conventions discussed in the lectures. The technical communications content will culminate in a term literature survey report on a materials-related subject of the student's choice, as discussed with the course instructors, and the term laboratory report.

The laboratories in MATLS 2H04A will build upon and apply the steel-based lecture content and the technical communications content of the lectures and tutorials. Laboratories will introduce and develop several skills essential for the Materials Engineer. To wit, the skills to be developed include:

- metallography and microstructural examination;
- relating processing routes (heat treatments) to microstructural evolution and mechanical properties.

These objectives will be accomplished by examining the effects of three common heat treatments on the microstructural development and mechanical properties of the most technologically important alloy currently being used by our civilization – plain carbon steels. Intermediate presentations on each of the three labs will be held to provide feedback to the student teams. The laboratory content of MATLS 2H04A will be integrated to determine the microstructure property relationships of the assigned plain carbon steels as a function of thermal processing route via a laboratory final report.

The lectures in MATLS 2H04B will comprise the following topics designed to reinforce the communications skills learned in MATLS 2H04A, to enable the student to fulfil the objectives of the term design project through the introduction of suitable tools and to develop creativity and innovation in problem solving:

- relevant theory underpinning the term design project;
- introduction to GRANTA EduPack 2020 materials selection tool/database;
- introduction to, and development of, your “Innovation Engine”;
- role of innovation/creativity in Engineering and Society;
- elements of making an effective idea pitch and writing an effective brief;
- idea pitch competition.

The tutorials in MATLS 2H04B will consist of the following activities designed to allow the student to practice and master the materials delivered in the lectures:

- introduction to and working with the GRANTA EduPack materials selection tool/database;
- exercises/activities for awareness and development of your “Innovation Engine”;
- team-directed idea pitch development activities.

The laboratories in MATLS 2H04B will centre around the term design project on a biodegradable coronary stent and will consist of the following elements:

- team-directed design project activities – materials selection;
- team-directed design project activities – biodegradability assessment;
- defined mechanical properties measurement demonstration;
- team-directed design project activities – mechanical integrity assessment;

- designated teamwork time (design presentation/design report/idea pitch).

The lectures, tutorials and laboratories of MATLS 2H04B will culminate in idea pitches centred around selected grand challenges and in a team design final report on the biodegradable stent.

### **Policy on Late Submission of Coursework**

All coursework must be submitted on time or deductions will be made without valid and documented reasons. All late coursework must be submitted directly to the appropriate A2L assignment/laboratory folder. Late course work will not be accepted by the TAs under any circumstances. All late penalties will be assessed by Dr McDermid or Dr. Kish. All late coursework will be assessed a penalty of 20% per day to zero credit.

### **Requests for Relief for Missed Academic Term Work – Policy on the Use of the McMaster Student Absence Form (MSAF)**

In the event of an absence for medical or other reasons for which an MSAF form has been submitted, students should review and follow the Academic Regulation in the Undergraduate Calendar for “Requests for Relief for Missed Academic Term Work”.

Use of the MSAF in MATLS 2H04A/B will automatically result in a 48 hour deferred due date for submission of the coursework after the submission of the MSAF. The deferred coursework will be due to the appropriate A2L assignment folder by 17:30 of the revised due date. If the deferred due date falls on a Saturday, Sunday or statutory holiday, the coursework will be due to the appropriate A2L assignment folder at 09:00 on the next working day.

### **Appeal of Marks:**

All queries or appeals of marks received on coursework should first be directed at the TA who marked the work – it is his or her responsibility to clarify deductions and remedy any errors. If, however, the student continues to feel that they received an unfair or erroneous deduction after discussing their case with the TA, students can submit their coursework to Dr. Kish or Dr. McDermid for re-marking. Students should note that re-marking by the course instructors may result in a lower mark being assigned than was originally received from the TA.

## **IMPORTANT POLICY NOTES FROM THE UNIVERSITY ADMINISTRATION**

### **Academic Integrity**

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. **It is your responsibility to understand what constitutes academic dishonesty.** Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the

[Academic Integrity Policy](https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/), located at <https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/>

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

### **Authenticity/Plagiarism Detection**

*Some courses may* use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc. ) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to [www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

### **Courses with an Online Element**

*Some courses may* use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

### **Online Proctoring**

*Some courses may* use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/ software during tests or exams. This software may be required to be installed before the test/exam begins.

### **Conduct Expectations**

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the [Code of Student Rights & Responsibilities](#) (the "Code").

All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

### **Academic Accommodation of Students with Disabilities**

Students with disabilities who require academic accommodation must contact [Student Accessibility Services](#) (SAS) at 905-525-9140 ext. 28652 or [sas.mcmaster.ca](http://sas.mcmaster.ca) to make arrangements with a Program Coordinator. For further information, consult McMaster University's [Academic Accommodation of Students with Disabilities](#) policy.

### **Academic Accommodation for Religious, Indigenous or Spiritual Observances (RISO)**

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the [RISO](#) policy. Students should submit their request to their Faculty Office **normally within 10 working days** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

### **Copyright and Recording**

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

### **Extreme Circumstances**

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.